AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph bridging pages 1 and 2 with the following rewritten paragraph:

The above electronic control system controls to exhibit the friction force of each tire to the maximum in order to stabilize a vehicle. This system aims to ensure vehicle directionability, steerability and controllability so as to avoid a danger by controlling the locked state of wheels by increasing or decreasing the hydraulic pressure of a brake or the torque of a driving system to obtain a slip ratio that ensures fully great cornering force and great braking force. Therefore, the slip ratio-friction characteristic curve of the tire, as shown in Fig. 8, is estimated and the slip ratio is controlled based on this estimated curve to obtain the maximum friction coefficient in limits not to cause a side slip. In order to detect the running state of the vehicle, an acceleration sensor and a yaw rate sensor are mounted on the vehicle to control the slip ratio of the tire based on signals from these sensors to stabilize the vehicle.

Please replace the paragraph bridging pages 4 and 5 with the following rewritten paragraph:

According to a fourth aspect of the present invention, there is provided a vehicle control method, wherein the amplitude of the above vibration is modulated to 1 to 2,000 % of the depth of a tread or the thickness of a top tread of rubber of the tire.

Please replace the third full paragraph on page 7 with the following rewritten paragraph:

Fig. 5 is a diagram showing the measurement results of dependence on longitudinal-direction slip ratio of the ~~horizontal-direction~~ transverse-direction friction coefficient of each tire according to the preferred embodiment of the present invention;

Please replace the third full paragraph on page 10 with the following rewritten paragraph:

Generally speaking, force generated by the tire is determined by friction force between the tire and the road surface and the deformation of the tire, and the maximum friction force between the tire and the road surface is determined by the surface roughness of the road surface and the viscoelastic characteristics of the top tread of rubber of the tire. That is, force generated by the tire is determined by the size of deformation of the tire within the maximum friction force between the tire and the road surface.

Please replace the paragraph bridging pages 10 and 11 with the following rewritten paragraph:

Changes in the longitudinal-direction slip ratio in a longitudinal direction and in the transverse-direction slip angle in a transverse direction are determined by the size of deformation of the tire and force generated by the tire is also determined by these changes. Although the size of deformation of the actual tire may be in the range of several millimeters to several tens of millimeters when the maximum friction force between the tire and the road surface is applied,

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the present invention makes it possible to control force generated by the tire by a control method

for controlling such small deformation by dynamic vibration, independently of the conventional

drive/brake steering system.

Please replace the equation on the first line on page 12 with the following rewritten equation:

$$\cancel{m\frac{d^2x}{dt^2} = F_n - 2m\Psi\omega_0\frac{dx}{dt} - m\omega_0 x}$$

$$m\frac{d^2x}{dt^2} = F_n - 2m\Psi\omega_o\frac{dx}{dt} - m\omega_o x$$

Please replace the equation on the seventh line on page 12 with the following rewritten paragraph:

$$\cancel{\mu_{rel} = \frac{\mu_e}{\mu_n} = \left\{\left[1-\left(\frac{\omega}{\omega_0}\right)^2\right]^2 + \left(\frac{2\Psi\omega}{\omega_0}\right)^2\right\}^{1/2}}$$

$$\mu_{rel} = \frac{\mu_e}{\mu_n} = \left\{\left[1-\left(\frac{\omega}{\omega_o}\right)^2\right]^2 + \left(\frac{2\Psi\omega}{\omega_o}\right)^2\right\}^{1/2}$$

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Please replace the second full paragraph on page 13 with the following rewritten paragraph:

In the figure, reference numeral 11 denotes target torque ~~computing~~ calculating means for ~~compmputing~~ calculating a motor torque instruction value T_{cal} from an acceleration signal θ, wheel speed n and motor torque T_M detected by motor drive means 12 for driving an electric motor 20 for driving each wheel of a vehicle. The wheel speed is obtained by converting a wheel revolution speed N detected by an unshown revolution sensor by means of a speed counter 13 and applied to the above target torque computing means 11.

Please replace the third full paragraph on page 14 with the following rewritten paragraph:

When control means such as the above target torque ~~computing~~ calculating means 11 and the vibration control means 14 are constituted with computer software, the above motor torque and acceleration signal are applied to the above means through an A/D converter and the above target drive torque signal is applied to the motor drive means 12 through a D/A converter.

Please replace the first full paragraph on page 15 with the following rewritten paragraph:

When the vehicle runs on a dry asphalt road, the drive turns off the friction control switch 17 to carry out regular running control. That is, the above target torque ~~computing~~ calculating means 11 computes a motor torque instruction value from the detected motor torque of the motor drive means 12, acceleration signal and wheel speed to carry out the feedback control of the

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electric motor 20 so that the drive torque of the electric motor 20 should be equal to the above

motor torque instruction value.

Please replace the paragraph bridging pages 15 and 16 with the following rewritten paragraph:

When the vehicle enters a low-μ road such as a wet asphalt road and the tires idle or slip,

the driver turns on the friction control switch 17 to apply vibration to each tire and runs while

controlling the friction force of the tire. When the friction control switch 17 is turned on, the

vibration control means 14 determines the amplitude, frequency and phase of micro-vibration to

be generated by the vibration generating means 15 according to motor torque detected by the

motor drive means 12 and applies them to the vibration generating means 15. The vibration

generating means 15 generates a micro-vibration signal based on a control instruction from the

vibration control means 14. This micro-vibration signal is added to a motor torque instruction

value from the target torque ~~computing~~ calculating means 11 by the micro-vibration adding

means 16 and the obtained signal is supplied to the motor drive means 12 as new target drive

torque. The motor drive means 12 drives the electric motor 20 based on the above new target

drive torque.

Please replace lines 11-12 on pages 18 with the following rewritten lines:

~~tire~~ Tire longitudinal-direction dynamic property state equation:

Please replace line 15 on pages 18 with the following rewritten line:

~~tire~~ Tire transverse-direction dynamic property state equation:

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Please replace the paragraph bridging pages 18 and 19 with the following rewritten paragraph:

In the above equations, F_x is force in the longitudinal direction of the tire, F_y is force in the transverse direction of the tire, ~~Kx~~ k_x is a spring constant in the longitudinal direction of the tire per unit area, k_y is a spring constant in the transverse direction of the tire per unit area, c_x is an attenuation coefficient in the longitudinal direction of the tire per unit area, c_y is an attenuation coefficient in the transverse direction of the tire per unit area, m is the mass of a tire crown portion per unit area, l is the length of the tire in contact with the ground, V is the speed of the vehicle, N is a load to be applied to the tire, λ is a slip ratio, α is the slip angle, and μ is the slip ratio of a slip ratio-friction curve or a slip angle-friction coefficient curve.

Please replace the paragraph bridging pages 19 and 20 with the following rewritten paragraph:

The size of a change in the friction force of the tire is determined by the ratio X of vibration amplitude (mm) to the slip ratio (%) between the tire and the road surface. The change in the friction force of the tire becomes greater as the above X value increases. As a result of experiments, a tire friction force changing effect is obtained when X is in the range of 0.1 to 2.0. More specifically, it has been confirmed that when the slip ratio is 1 %, the effect is obtained at a vibration amplitude of 0.1 to 2 mm and when the slip ratio is 100 %, the effect is obtained at a vibration amplitude of 10 to 200 mm. The value is equivalent to an amplitude of 1 to ~~200~~ 2000 % when the thickness of the tread rubber is 10 mm. Since the size of the vibration amplitude is a function of the relative slip speed of the tire in contact with the ground and the friction

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coefficient of the road surface, it is preferred to control the amplitude of dislocation vibration in

the actual test. However, in this embodiment, a change in the revolution speed of the tire which

is changed by a vibration torque value or voltage value fedback by the model follow-up control

law is used to carry out amplitude modulation control.

Please replace the first full paragraph on page 24 with the following rewritten paragraph:

To verify the effect of the present invention, a running test was conducted using an

electric vehicle which controls two wheels independently of the other two as an experimental

vehicle. Fig. 6 is a block diagram showing the constitution of this experimental vehicle 30, and

two AC motors 31L and 31R were mounted as drive power sources to transmit power to right

and left rear tires 32L and 32R through shafts 33L and 33R, respectively. Batteries (lead storage

batteries) 34L and 34R were applied as power sources and the voltages of the batteries 34L and

34R were controlled by drivers 35L and 35R and applied to the above AC motors 31L and 31R

through inverters 36L and 36R, respectively.

Please replace the first full paragraph on page 25 with the following rewritten paragraph:

As a control system, voltage amplitude control such that a micro-voltage vibration

corresponding to feedback torque is added to an acceleration signal operated by the driver, was

carried out using the above model follow-up control program. The frequency was modulated to

a range of 20 to 100 Hz to match the speed of the vehicle.

Please replace the first full paragraph on page 26 with the following rewritten paragraph:

(2)   The driver operates the steering wheel to turn <u>on</u> a wet asphalt road ($\mu = 0.4$) at V = 50 km/h so that the actual steering angle of the front wheels became 3 degrees and then stepped on the accelerator about 3 seconds after the start of turning to rapidly increase the speed. In this test, the behavior of the vehicle was observed when micro-vibration control was conducted and when not conducted.

Please replace the paragraph bridging pages 26 and 27 with the following rewritten paragraph:

It has been thereby confirmed from the acceleration tests on running straight and on turning that when micro-vibration control is carried out, the behavior of the vehicle is more stable than when micro-vibration control is not carried out. It has also been confirmed from the constant-speed turning test that the turning speed is 10 % higher when micro-vibration control is carried out <u>than</u> when micro-vibration is not carried out.

Please replace the second full paragraph on page 28 with the following rewritten paragraph:

That is, by ~~proving~~ <u>providing</u> means of generating vibration in the force direction of the tire to be controlled, the deformation of the tire in that direction can be controlled with the result that force generated by the tire (friction force of the tire with the road surface) can be freely controlled.